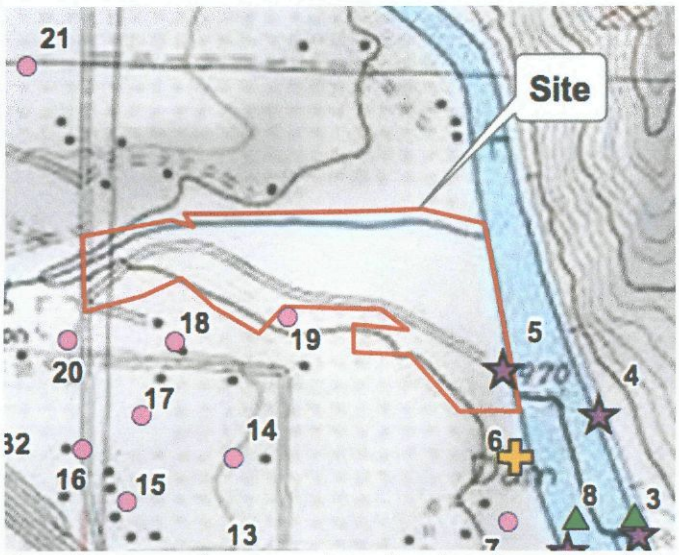
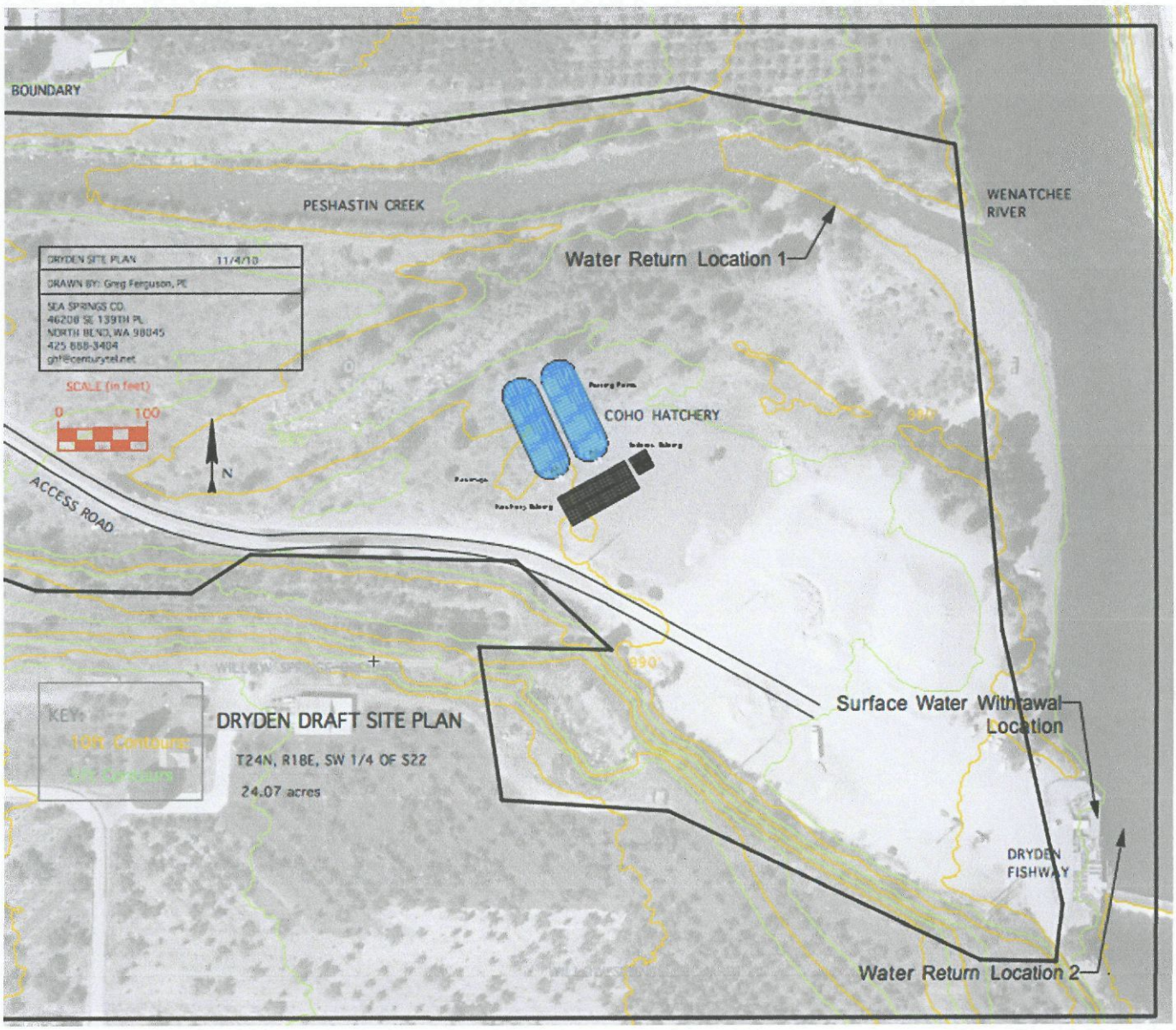
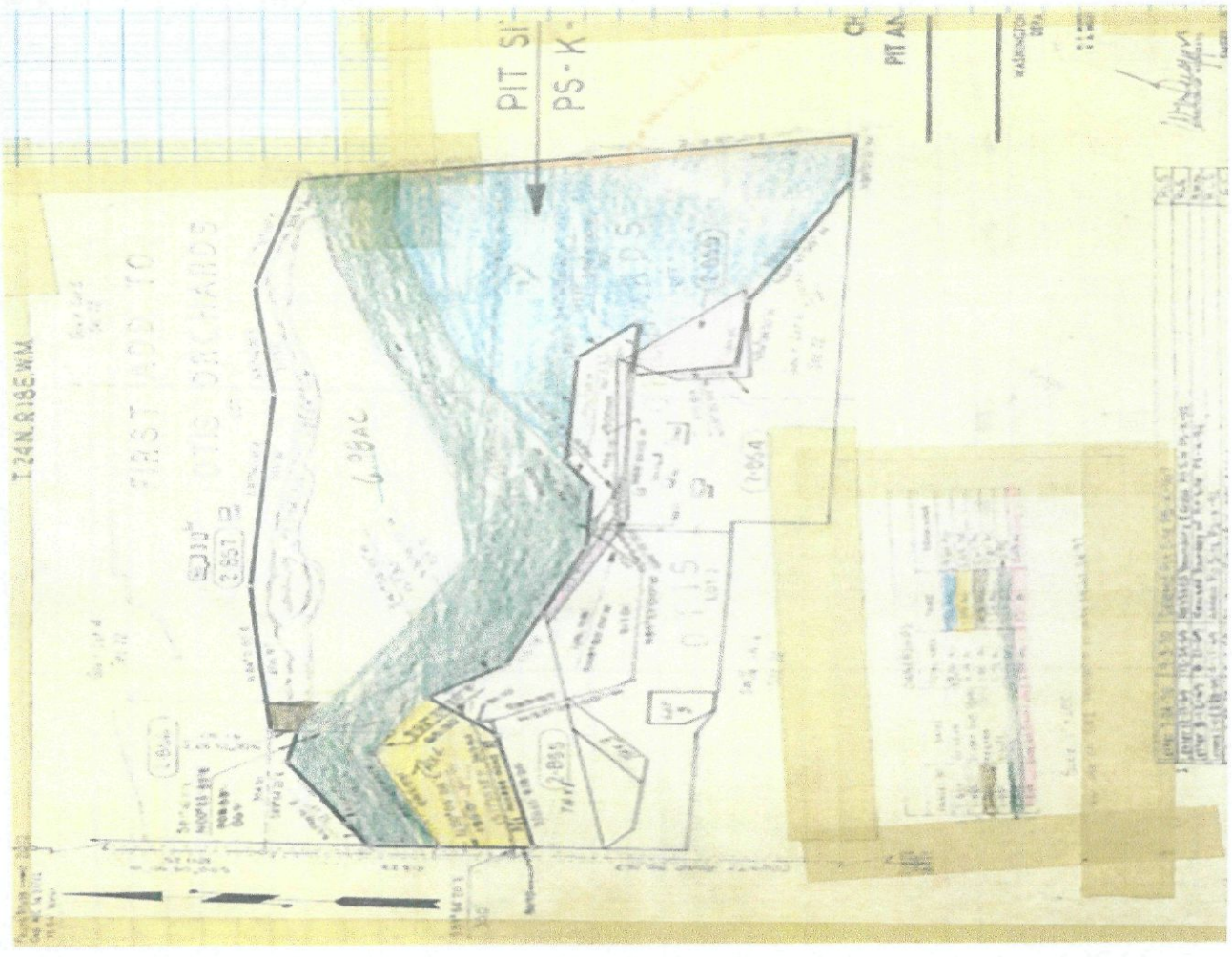


Attach a map of your project showing the point of diversion/withdrawal and place of use. If platted property, be sure to include a complete copy of the plat map.

The place of use is the Coho Hatchery shown below. There are 2 return locations.





Section 5. WATER SYSTEM DESCRIPTION

Describe your proposed water system (include type and size of devices used to divert or withdraw water from source): Wenatchee River water is proposed to be pumped from the Dryden fishway. An intake would be built into the existing concrete structure at location A on the drawing below. This location allows water to be pumped at all river flow conditions without impacting fishway operation and does not require excavation in the river bank for construction. Water would be delivered to the hatchery in an 850' long buried pipeline.

Water will be returned upstream of the removal location in Peshastin Creek or at the removal location near the dam (location B below). The withdrawal will have a positive effect on ESA listed fish (see attached report).

1.1 Surface Water Withdrawal Impacts

1.1.1 Wenatchee Subbasin

1.1.1.1 Dryden Site

A small hatchery is proposed to be developed at this site. A combination of surface and groundwater sources is being explored to supply of up to 7.4 cfs (4.5 cfs surface water) to the site. The amount needed changes over the year (Figure 1). The impact of groundwater withdrawals on surface water is expected to be small as discussed in section **Error! Reference source not found.** of this report.

An intake located on the Dryden fishway is currently the preferred source for surface water. Two options are being considered for the return flow. One is to discharge return water into Peshastin Creek upstream of the fishway, and another is in a pipeline on the river bottom in the vicinity of the fishway near the proposed intake. The Peshastin discharge could help adult salmon navigate the mouth during low flow and would increase flow from the discharge site to the intake site downstream. Discharge near the fishway could help flush rock away from the fishway but would essentially result in minimal change in flow because water would be discharged near the intake.

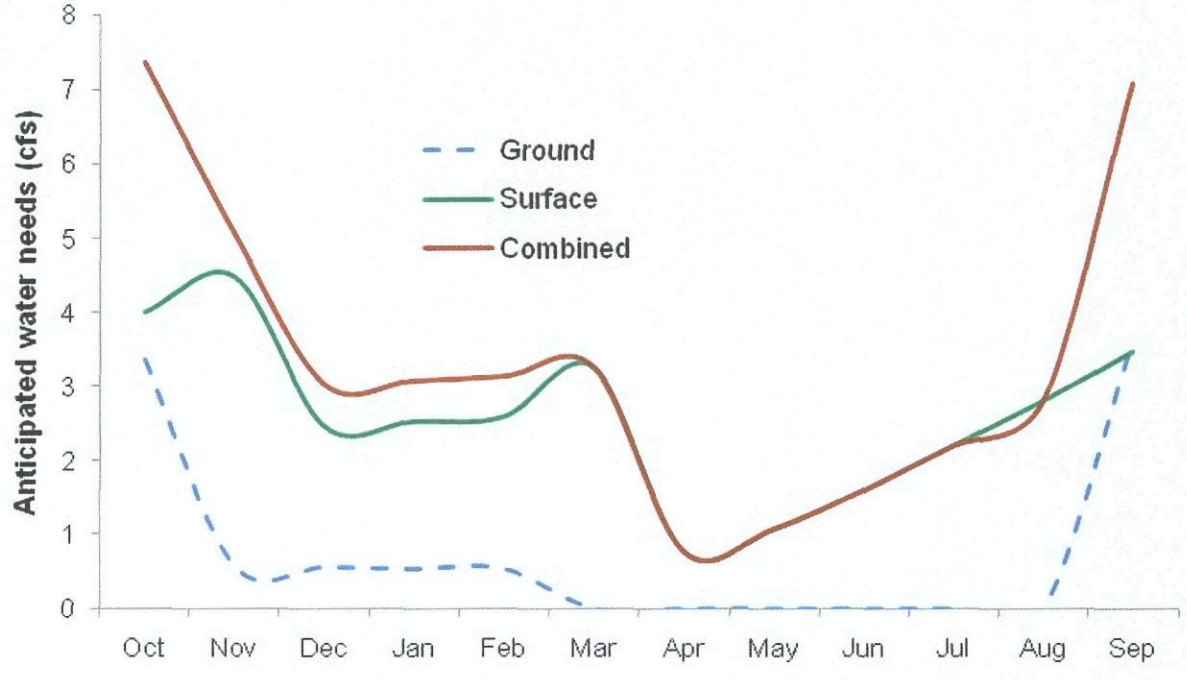


Figure 1. Proposed water needs for all species at the proposed MCCRP Dryden hatchery.

We used the PHABSIM analysis developed by EES Consulting to assess the potential impacts of the proposed MCCRP component of the Dryden hatchery water use on ESA listed fish in Peshastin Creek and Wenatchee River. We analyzed the Peshastin discharge option because it has the largest possible impact on stream flow, and therefore represents the greatest potential to

affect fish and fish habitat. The affected environment would include Peshastin Creek from the point of discharge downstream to the proposed intake at the fishway in the Wenatchee River. This includes about 200 lineal feet of Peshastin Creek, and 650 feet of the Wenatchee River. The daily mean flow in Peshastin Creek ranges from a low of around 10 cfs in mid-August to over 500 cfs in May (Figure 2). The daily mean flow in the Wenatchee River ranges from a low of around 750 cfs in September to nearly 10,000 cfs by late May (Figure 2).

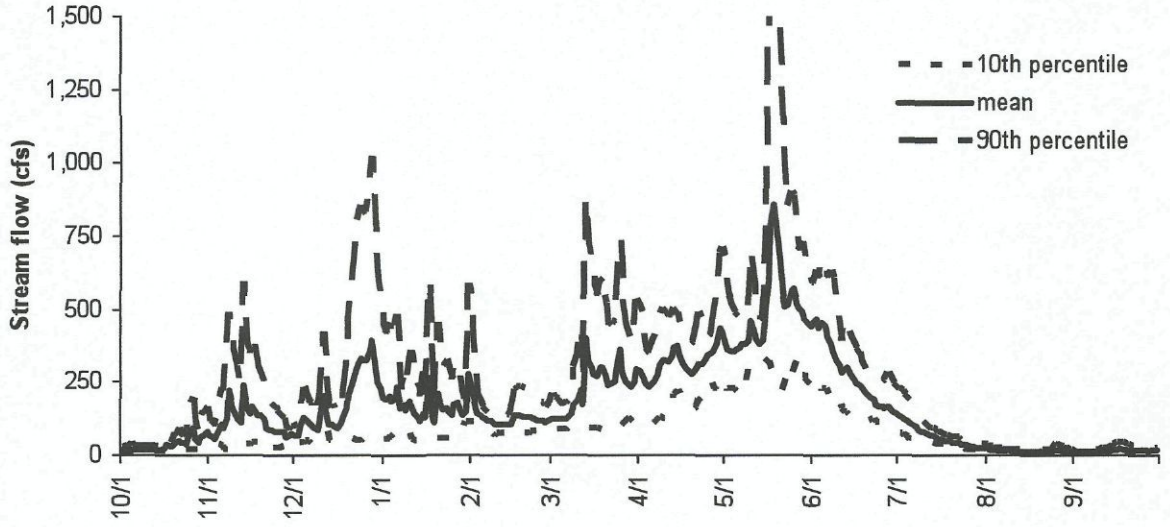


Figure 2. Peshastin Creek stream gage data collected at Green Bridge Rd by Washington Department of Ecology, 2002-2009 (Data source: https://fortress.wa.gov/ecy/wrx/wrx/flows/station.asp?sta=45F070).

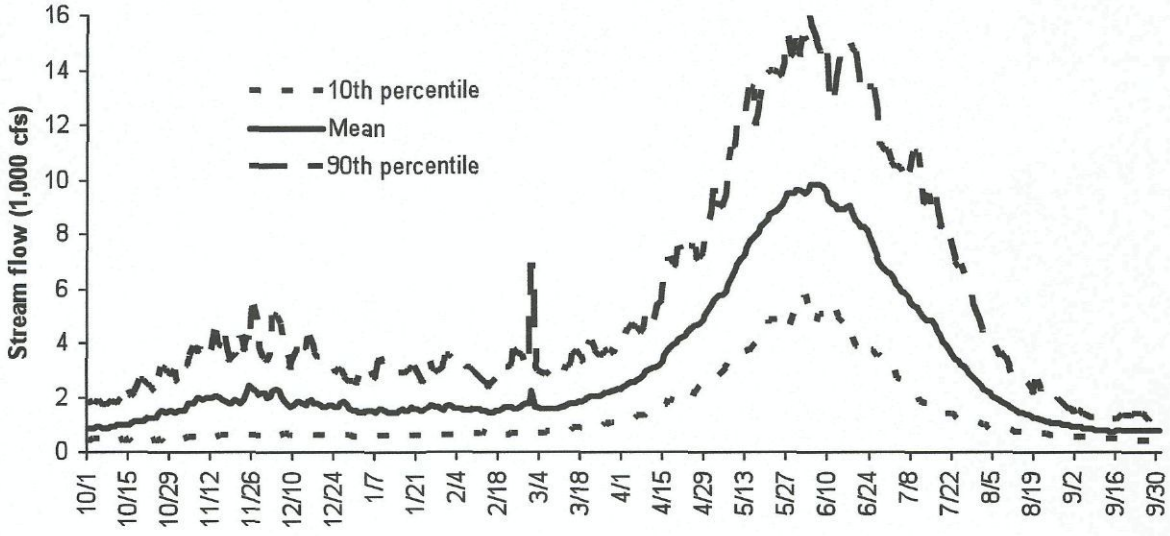


Figure 3. Wenatchee River stream gage data collected at Peshastin by US Geological Survey, 1930-2008 (Data source: http://waterdata.usgs.gov/wa/nwis/inventory/?site_no=12459000&agency_cd=USGS&).

EES Consulting (2005) completed PHABSIM analyses of four reaches of the mainstem Wenatchee River from the Leavenworth National Fish Hatchery downstream to its mouth, and the lower reach of Peshastin Creek from approximately RM 5.0 downstream to its mouth. They estimated that spawning habitat WUA was maximized at Peshastin Creek flows of 80 cfs for non-ESA listed summer Chinook salmon (spring Chinook do not spawn in the affected portions of the Wenatchee River and Peshastin Creek) and 120 cfs for ESA listed summer steelhead (Figure 4 top). Estimated rearing habitat was maximized at flows of 55 cfs for Chinook, 130 cfs for steelhead, and 19 cfs for bull trout (Figure 4 bottom).

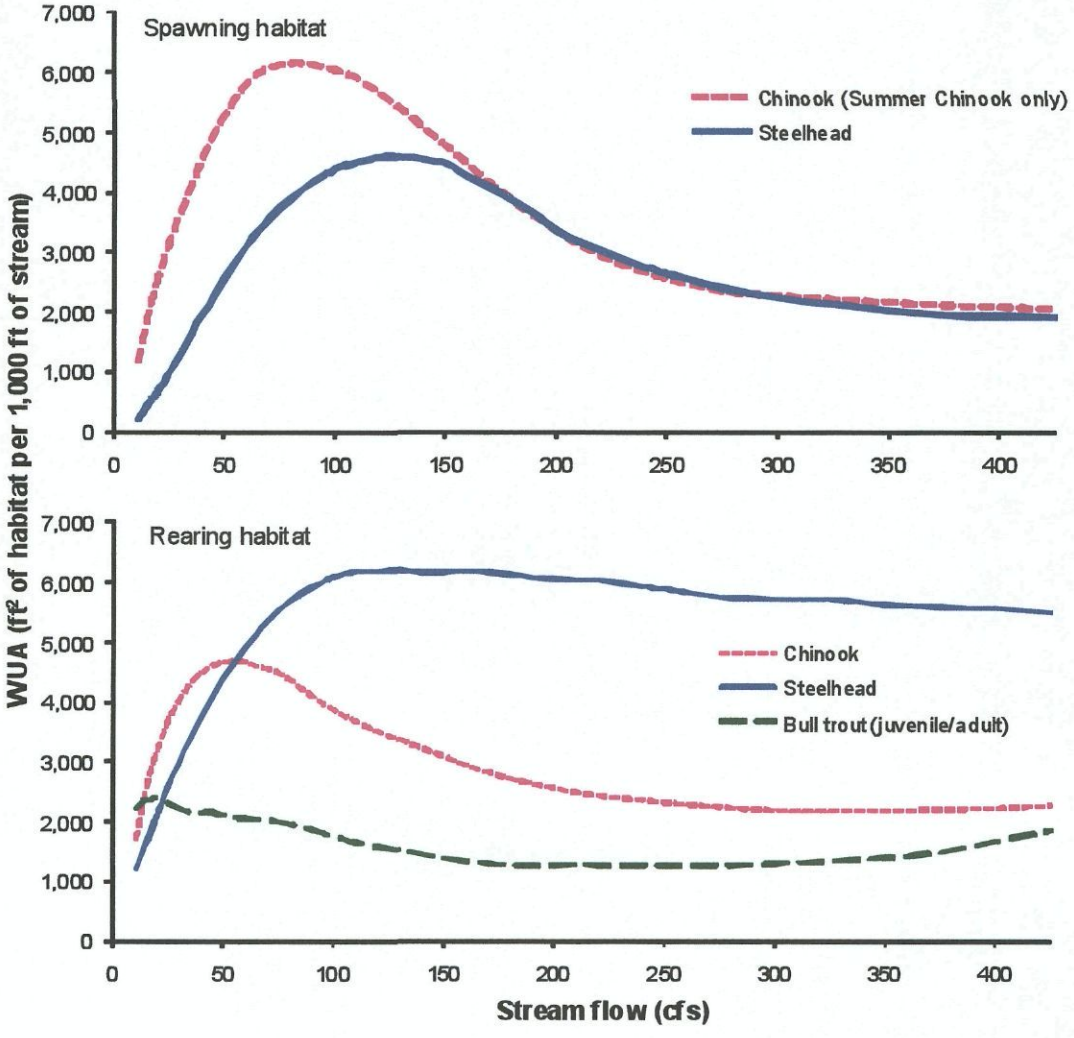
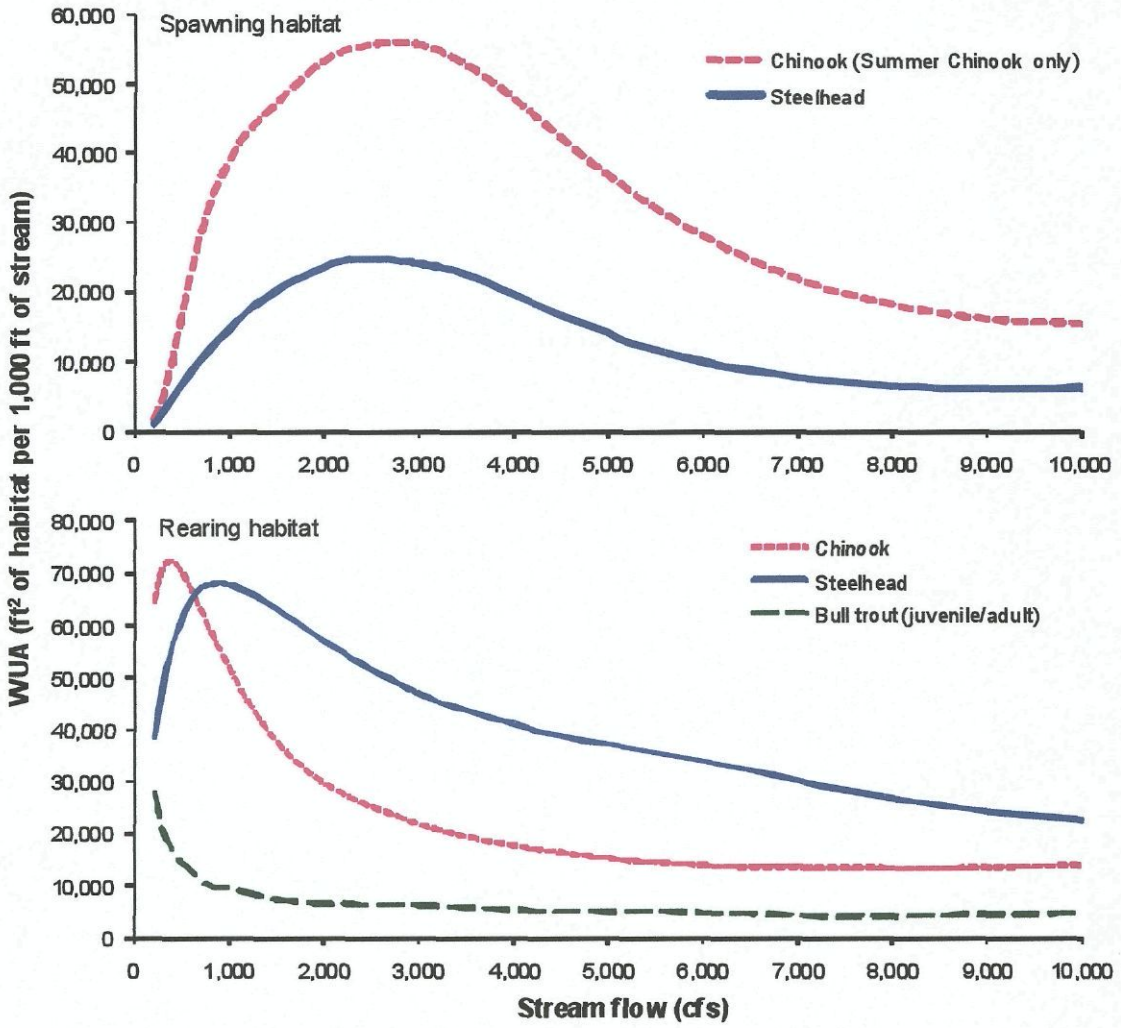


Figure 4. Estimated weighted useable area (WUA) of spawning habitat (top) and rearing habitat (bottom) as a function of stream flow in Peshastin Creek. Figure derived from EES Consulting (2005).

The portion of the Wenatchee River from Peshastin Creek down to Dryden Dam was encompassed in Reach 1 of their analysis. EES Consulting (2005) estimated that spawning habitat was optimized in this reach of the Wenatchee River at flows of 2,800 cfs for Chinook and

2,400 cfs for steelhead (Figure 5 top). Estimated rearing habitat was maximized at flows of 400



cfs for Chinook, 900 cfs for steelhead, and 220 cfs for bull trout (Figure 5 bottom).

Figure 5. Estimated weighted useable area (WUA) of spawning habitat (top) and rearing habitat (bottom) as a function of stream flow in the Wenatchee River. Figure derived from EES Consulting (2005).

For modeling purposes, we assumed that 6.2 cfs (approximately 40% above the maximum proposed surface water needs, Figure 1) of water was drawn from the proposed intake site at the Dryden fishway and discharged upstream into Peshastin Creek (impact reach). This would result in a net increase of 6.2 cfs flow from the point of discharge to the intake site and that downstream flows would not be affected (because the increased flow would be offset by the intake). In reality, the amount of water needed will vary depending on the time of year (Figure 1) so the change in flow will be substantially less during some months than others. We evaluated WUA of spawning habitat for summer Chinook salmon during August and September, and steelhead from March through May. WUA of rearing habitat was evaluated over the entire year

for all species. For each time period, we evaluated the minimum and maximum mean daily flows and the extreme low flow (minimum 10th percentile flow) where possible. For Peshastin Creek, the extreme low flow and maximum mean flows were sometimes beyond the range of flows used in the PHABSIM analysis (EES Consulting 2005). The Peshastin River extreme low flows were outside the range of flows used in the PHABSIM analysis so we were not able to evaluate the impact on habitat at these flows .

Table 1. Estimated percent of weighted useable area (WUA) of habitat for various flow values in Peshastin Creek compared to the additional flow resulting from a discharge of 6.2 cfs into Peshastin Creek from the proposed MCCRP component at the Dryden hatchery.

Species	Lifestage	Timing	Flow type	Flow (cfs)	% of WUA	+6.2cfs % of WUA
Chinook	Spawning	Aug-Sep	Optimal	80	100.0%	
			Extreme low[a]	1		
			Mean low	10	15.9%	34.8%
			Mean high	22	45.9%	57.1%
	Rearing	All year	Optimal	55	100.0%	
			Extreme low[a]	1		
			Mean low	10	32.5%	58.2%
			Mean high[b]	425	48.2%	48.4%
Steelhead	Spawning	Mar-May	Optimal	120	100.0%	
			Extreme low	74	80.7%	85.7%
			Mean low	120	100.0%	99.9%
			Mean high[b]	425	41.6%	41.5%
	Rearing	All year	Optimal	130	100.0%	
			Extreme low[a]	1		
			Mean low	10	17.7%	28.3%
			Mean high[b]	425	88.8%	88.6%
Bull trout	Rearing	All year	Optimal	19	100.0%	
			Extreme low[a]	1		
			Mean low	10	91.1%	98.6%
			Mean high[b]	425	77.3%	79.4%

[a] The extreme low represented by the minimum 10th percentile of daily flows for that period, was more than 10% less than the lowest flow used in the PHABSIM analysis by EESConsulting. No estimates of WUA were available.

[b] The mean high was greater than 10% of the highest flow used in the PHABSIM analysis by EES Consulting. We used the highest value they evaluated in this analysis.

The increased flow had very little effect on the modeled percent of WUA in the Wenatchee River (Table 2). Although there were both positive and negative effects on the percent of WUA, the difference was always less than 1%.

The increased flow typically resulted in a modeled increase in the percent of WUA in Peshastin Creek but varied with species and lifestage (Table 1). The increased flow had a greater effect on WUA at low flows than during high flow periods. Optimal flow for summer Chinook salmon spawning (80 cfs) is typically not reached during the spawning season so any increase in flow had a positive effect on amount of WUA. The increased flow during the mean low flow

increased the percent of WUA of summer Chinook salmon spawning habitat from 15.9 to 34.8%. In a few scenarios, the increased flow resulted in slight reductions (less than 1%) in the percent of WUA.

Table 2. Estimated percent of weighted useable area (WUA) of habitat for various flow values in the Wenatchee River compared to the additional flow resulting from a discharge of 6.2 cfs into Peshastin Creek from the proposed MCCRP component at the Dryden hatchery.

Species	Lifestage	Timing	Flow type	Flow (cfs)	% of WUA	+6.2cfs % of WUA
Chinook	Spawning	Aug-Sep	Optimal	2,800	100.0%	
			Extreme low	405	17.2%	17.9%
			Mean low	751	53.5%	54.0%
			Mean high	2,310	98.4%	98.5%
	Rearing	All year	Optimal	400	100.0%	
			Extreme low	397	99.9%	99.9%
			Mean low	751	84.6%	84.3%
			Mean high	9,840	19.3%	19.3%
Steelhead	Spawning	Mar-May	Optimal	2,400	100.0%	
			Extreme low	664	37.9%	38.4%
			Mean low	1,570	83.6%	83.8%
			Mean high	9,660	24.8%	24.8%
	Rearing	All year	Optimal	900	100.0%	
			Extreme low	397	81.2%	81.9%
			Mean low	751	99.1%	99.2%
			Mean high	9,840	33.8%	33.7%
Bull trout	Rearing	All year	Optimal	220	100.0%	
			Extreme low	397	62.7%	61.9%
			Mean low	751	38.0%	37.7%
			Mean high	9,840	16.2%	16.2%

The results of this analysis indicated that withdrawing water from the Dryden fishway and discharging it into Peshastin Creek would generally have a positive effect on ESA listed fish in Peshastin Creek and little to no effect on those in the Wenatchee River. The effects will be limited to the impact reach and the magnitude will depend on the amount of water involved.

Fish passage at the mouth of Peshastin Creek has been identified as being limited by low flow conditions in the late summer and early fall (Andonaegui 2001, NPCC 2004). Discharge of hatchery water into the creek during these periods could improve hydraulic conditions for returning adults.